UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/826,431	04/04/2001	Jerome J. Cuomo	5051-511	8488

20792 7590 01/29/2003

MYERS BIGEL SIBLEY & SAJOVEC
PO BOX 37428
RALEIGH, NC 27627

EXAMINER	
TRAN, MY CHAU T	

ART UNIT	PAPER NUMBER
1639	

DATE MAILED: 01/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/826,431	CUOMO ET AL.	
	Examiner	Art Unit	
	My-Chau T. Tran	1639	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 November 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20 and 33-54* is/are pending in the application.

4a) Of the above claim(s) *33-43* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20 and 44-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *12* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. Applicant's amendment filed 9/11/02 in Paper No. 9 is acknowledged and entered. Claims 1 and 44-50 are amended. Claims 33-43 have been withdrawn from further consideration a being drawn to a non-elected invention. Claims 1-20 and 33-54 are pending.

2. Applicant has also stated that claims 33-43 are cancel without prejudice. This is not a proper request of cancellation of the non-elected claims. To properly request cancellation of the non-elected claims, applicant must submit an amendment stating "cancel claims 33-43". Therefore, claims 33-43 have been withdrawn from further consideration a being drawn to a non-elected invention.

3. Claims 1-20 and 44-54 are treated on the merit in this Office Action.

Withdrawn Rejections

4. The previous rejections under 35 USC 112, first and second paragraph, and 35 USC 102(b) for claims 1-20 and 44-54 have been withdrawn in view of applicant's amendment of claims 1, and 44-50.

New Rejections – Necessitated by Amendment

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it

pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-20, 44-45, and 47-54 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabled for coating the substrate with $Si(CH_3)_4$, the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the presently claimed scope of possible coating compound combinations as define by the definitions of (1)-(4) of claims 1, 44-45, and 47-50 in which the elements are selected from the group consisting of M, O, C, H, and N wherein M is a metal (e.g. 9 different type of metal claimed).

There are many factors to consider when determining whether there is sufficient evidence to support a determination that a disclosure does not satisfy the enablement requirement and whether any experimentation is "undue". These factors include, but are not limited to:

1. The breadth of the claims.
2. The nature of the invention
3. The state of the prior art;
4. The level of one of ordinary skill
5. The level of predictability in the art;
6. The amount of direction provided by the inventor;
7. The presence or absence of working examples;
8. The quantity of experimentation necessary needed to make or use the invention based on the disclosure; See :*In re Wands* USPQ 2d 1400 (CAFC 1988):

(1-2) The breadth of the claims and the nature of the invention:

The present claim is directed to a substrate with a coated surface. Applicant's claimed coating comprise an amorphous chemically crosslinked materials that include not only the $Si(CH_3)_4$; but additionally encompass all possible combinations as define by the definitions of

(1)-(5) of claims 1, 44-45, and 47-50 in which the elements are selected from the group consisting of M, O, C, H, and N wherein M is a metal (e.g. 9 different type of metal claimed). Accordingly, applicant's claimed invention encompasses an infinite number different combinations of coating that would include natural coating such as charcoal for which the coating is define by definition (3).

(3 and 5) The state of the prior art and the level of predictability in the art:

In the chapter of combinatorial aspects of material science of *Handbook of Combinatorial Chemistry* (Vol. 2, 2002, K.C. Nicolaou, R. Hanko, W. Hartwig editors) that cover the years of 1995-2001 (pg. 1019, lines 20-22), states that there is various methods of depositing films onto a substrate and that "*the lack of precise stoichiometric control and limited compositional range have relegated the technique primarily to optimization and exploration of systems with only two independent variables*" (pg. 1022, lines 24-42). Further, the specification disclosed that there are a variety of techniques of coating the substrate and in the process of PECVD (plasma enhanced chemical vapor deposition) that there are many factors that influence the specific compositions and properties of the coatings and two of those factors are the type of precursor and process conditions that are used (pg. 7, lines 20-21). Therefore, the different aspects of coating a substrate cannot be predicted *a priori* but must be determined on a case to case base through experimental study.

(4) The level of one of ordinary skill in the art:

The level of skill would be high, most likely at the Ph.D. level.

(6-7) The amount of direction provided by the inventor and the existence of working examples.

The working examples are directed to coating the substrate with $Si(CH_3)_4$ as the precursor.

Accordingly, the specification discloses only limited examples that are neither representative of the claimed genus of coating compound combinations as define by the definitions of (1)-(5) of claims 1, 44-45, and 47-50 in which the elements are selected from the group consisting of M, O, C, H, and N wherein M is a metal (e.g. 9 different type of metal claimed).

(8) The quantity of experimentation needed to make or use the invention based on the content of the disclosure:

Accordingly, the undue breadth of possible coating compound combinations as define by the definitions of (1)-(5) of claims 1, 44-45, and 47-50 in which the elements are selected from the group consisting of M, O, C, H, and N wherein M is a metal (e.g. 9 different type of metal claimed), the lack of guidance presented in the specification, the lack of representative examples for both making and use, necessitate the illustration of further examples demonstrating the making and use of a representative sample of coating compounds in order to provide the requisite enablement for the presently claimed invention as broadly claimed.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-5, 8-9, 11-14, 44-45, 47-50 and 53-54 rejected under 35 U.S.C. 102(b) as being anticipated by Hu et al. (US Patent 5,494,712).

The present invention claimed a substrate comprise of coating with a terminated electrophilic or nucleophilic functional group, wherein the coating comprise of elements are selected from the group consisting of M, O, C, H, and N wherein M is a metal. The metal is silicon.

Hu et al. discloses a coated substrate (col. 1, lines 45-53). The substrate comprises a polymer coating that is further characterized as being a highly crosslinked polymer containing at least on of the following groups (col. 2, lines 7-17). The groups are Si-O-Si, Si-CH_2, Si-H, and Si-OH. The organosilicone compound (precursor) use includes silanes and siloxanes (col. 7, lines 25-38) (refer to claim 53). The silanes include tetramethoxysilane (refer to claim 54). The method of depositing the coating is PECVD (plasma enhanced chemical vapor deposition) (col. 4, lines 3-24). The substrate coating can be flexible (an amorphous chemically crosslinked material) (col. 7, lines 13-15). Therefore, the coated substrate of Hu et al. anticipates the presently claimed invention.

9. Claims 1-20, 44-45, and 47-50 are rejected under 35 U.S.C. 102(b) as being anticipated by Cozzette et al. (US Patent 5,063,081).

The present invention claimed a substrate comprise a base layer, an intermediate layer and a coating with a terminated electrophilic or nucleophilic functional group, wherein the coating comprise of elements are selected from the group consisting of M, O, C, H, and N

wherein M is a metal. The metal is silicon. The biomolecule is adsorbed to the electrophilic functional group.

Cozzette et al. disclose a coated substrate comprises a planar wafer (base layer), a base sensor (intermediate layer), and a semipermeable solid film (coating) (col. 13, lines 54-62). The semipermeable solid film can function as adhesion promoters for biomolecule (col. 13, lines 65-68 to col. 14, lines 1-4). The planar wafer includes silicon wafer, glass sheet, or plastic (col. 26, lines 66-68 to col. 27, lines 1-6) (referring to claim 18). The base sensor includes titanium or gallium arsenide (col. 27, lines 7-20) (referring to claim 20). The base sensor is between the planar wafer and the semipermeable solid film (col. 13, lines 54-62; fig. 2) (referring to claim 19). The semipermeable solid film comprise of a silane compound that include a terminal amine group in which an enzyme can be attached (col. 28, lines 50-62). The thickness of the semipermeable solid film lies in the range of 1 to about 1000 nm (col. 30, lines 29-34) (referring to claim 17). Therefore, the coated substrate of Cozzette et al. anticipated the claimed invention.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hu et al. (US Patent 5,494,712) in view of Matsui et al. (US Patent 5,403,630).

The present invention claimed a substrate comprise of coating with a terminated electrophilic or nucleophilic functional group, wherein the coating comprise Si, C, and H deposited in a PECVD process with a tetramethyl silane ($Si(CH_3)_4$) precursor.

Hu et al. discloses a coated substrate (col. 1, lines 45-53). The substrate comprises a polymer coating that is further characterized as being a highly crosslinked polymer containing at least on of the following groups (col. 2, lines 7-17). The groups are Si-O-Si, $Si-CH_2$, Si-H, and Si-OH. The organosilicone compound (precursor) use includes silanes and siloxanes (col. 7, lines 25-38) (refer to claim 53). The silanes include tetramethoxysilane (refer to claim 54). The method of depositing the coating is PECVD (plasma enhanced chemical vapor deposition) (col. 4, lines 3-24). The substrate coating can be flexible (an amorphous chemically crosslinked material) (col. 7, lines 13-15).

The coated substrate of Hu et al. does not expressly disclose that the precursor of tetramethyl silane.

Matsui et al. disclose a coated substrate (col. 1, lines 67-68 to col. 2, lines 1-3). The method of coating the substrate is vapor-phase growth method. The organosilicone compound (precursor) use includes tetramethyl silane (col. 3, lines 42-47).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to include tetramethyl silane as a precursor as taught by Matsui et al. in the coated substrate of Hu et al. One of ordinary skill in the art would have been motivated to include tetramethyl silane as a precursor in the coated substrate of Hu et al. for the advantage of forming a highly insulating thin film having good step coverage. Since both Hu et al. and Matsui et al. disclose using as a precursor organic oxysilane compound and the reactant is in the gaseous form (Hu: col. 5, lines 3-6 and col. 7, lines 25-38; Matsui: col. 2, lines 4-11 and col. 3, lines 42-47).

Response to Arguments

13. Applicant's arguments with respect to claims 1-20 and 44-54 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to My-Chau T. Tran whose telephone number is 703-305-6999. The examiner is on ***Increased Flex Schedule*** and can normally be reached on Monday: 8:00-2:30; Tuesday-Thursday: 7:30-5:00; Friday: 8:00-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew J. Wang can be reached on 703-306-3217. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9307 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1123.

mct
January 27, 2003

PADMASHRI PONNALURI
PRIMARY EXAMINER